# Children's Health Protection Advisory Committee

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March 3, 2006

Stephen L. Johnson, Administrator
United States Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

RE: Proposed NAAQS for Particulate Matter

Dear Administrator Johnson:

The Children's Health Protection Advisory committee (CHPAC) appreciates this opportunity to provide comments to you on the proposed particulate matter standards. As the EPA's advisory panel on children's environmental health, we urge you to set the final National Ambient Air Quality Standards (NAAQS) for fine and coarse particulate matter at lower levels than proposed on December 20, 2005. While the proposal to lower the daily PM2.5 standard is a step in the right direction, the proposed standards do not provide adequate protection for infants and children. In addition, we urge you to extend coverage of the coarse particulate matter standard to rural areas, and to continue national monitoring of coarse particulate matter levels in both urban and rural areas. Finally, we urge you to reconsider exempting the agricultural and mining industries from regulation under the coarse particulate matter standard.

The mandate of the Clean Air Act is to set health-based standards for air pollutants at levels adequate to protect the public health, including the health of susceptible populations, with an adequate margin of safety. These principles have not only held up over time as the foundation of enormously effective public health interventions in air quality, they have also been upheld by the Supreme Court. The proposed standards do not provide an adequate margin of safety. In our letter of August, 8, 2005, we documented the many health effects of particulate matter on children, including exacerbation of asthma, reduced lung function, increased chronic respiratory symptoms, infant mortality, and adverse birth outcomes (Schwartz, 2004; AAP, 2004, U.S.EPA, 2005). These effects have been observed in a number of studies at exposure levels near and below the proposed standards.

We are especially concerned that it appears the health of children was neither adequately nor explicitly considered in determining the proposed standards, in particular with respect to the margin of safety considerations. Children breathe more air per body weight and per surface area of the lung than adults, are more active outdoors than adults, and there is likely higher deposition of particulate in the respiratory tract of children than adults (Phalen et al, 1985). Thus, children receive a higher dose than adults in the same setting. Furthermore, the respiratory tract is still developing postnatally, and is more vulnerable to insult than the adult lung. Finally, asthma prevalence and morbidity is higher in children than adults (Mannino et al., 1998), and asthmatics are especially susceptible to particulate matter pollution. These factors contribute to the adverse health effects observed in children at or below the level of the proposed standard. We strongly support the principle that the nation's children, who are especially susceptible to the harmful effects of air pollution, should be protected under the NAAQS.

The CHPAC has the following recommendations regarding the proposed Particulate Matter NAAQS.

**1. Reduce the Proposed Annual Average Standard for PM2.5**

Studies on health effects in children from chronic exposure to $PM_{2.5}$ provide evidence that children are not adequately protected by a standard of 15 $\mu g/m^3$. A study of children in Los Angeles demonstrated that long-term exposure to $PM_{2.5}$ (mean across communities about 15 $\mu g/m^3$) was significantly associated with clinically reduced lung function at age 18 years (Gauderman et al., 2004), which is likely to be an irreversible effect. A number of studies of traffic-related pollution have shown associations between fine particles and adverse respiratory outcomes, including asthma in children who live near major roadways (van Vliet et al., 1997; Brunekreef et al., 1997; Kim et al., 2004), with mean annual average fine particle concentrations near and below 15 $\mu g/m^3$. The Harvard 24-cities study (Raizenne et al., 1996) showed effects on children's lung function at a mean of 14.5 $\mu g/m^3$.

The EPA based its annual standard for $PM_{2.5}$ on mortality studies in adults because of the robust nature of the data. In evaluating studies of the health effects of chronic exposure to particulate matter, EPA staff use the mean of the measured chronic exposure levels as the approximate effects level. The mean exposure level across a number of studies demonstrating health effects in children, including those cited above, is at or below the level of the proposed annual $PM_{2.5}$ standard of 15 $\mu g/m^3$. Thus, the proposed annual standard does not provide the required adequate margin of safety to protect infants and children.

**2. Reduce the Proposed Short-term Standard for PM2.5.**

The proposed 24-hour average (daily) standard for $PM_{2.5}$ of 35 $\mu g/m^3$ (98$^{th}$ percentile form), which is based on studies in adults, will leave a significant number of children unprotected from short-term effects on respiratory health. Several investigations demonstrate adverse respiratory health effects in children at daily levels (upper percentiles) near the proposed short-term standard, including respiratory hospital admissions, decreased lung function, asthma exacerbations, and respiratory symptoms

(Delfino et al, 1997; Tiittanen et al, 1997; Norris et al, 1999; Schwartz and Neas, 2000; Delfino et al., 2002; Delfino et al., 2004; Lewis et al, 2005; Barnett et al, 2005). Additional studies have found significant elevations in adverse birth outcomes including prematurity (Ritz et al., 2000; Sagiv et al, 2005; Wilhelm and Ritz, 2005), low birth weight or small-for-gestational age (Ha et al., 2001; Wilhelm and Ritz, 2003, 2005; Parker et al., 2005) and heart defects (Gilboa et al., 2005), as well as elevated risk of infant mortality (Loomis et al., 1999; Bobak and Leon, 1999; Lipfert et al., 2000; Ha et al., 2003; Woodruff et al., 1997, 2006) in association with measures of daily $PM_{10}$ or $PM_{2.5}$. In some studies, the upper percentiles of the distribution of daily PM were close to or below the proposed daily $PM_{2.5}$ standard of 35 $\mu g/m^3$ ($98^{th}$ percentile form). We urge the Administrator to take into consideration the serious health effects reported in these studies and revise the daily $PM_{2.5}$ standard downward to protect children's health.

**3. Reduce the Short-term Coarse PM (PM10-2.5) Standard**

The Notice of Proposed Rulemaking (NPRM) proposes a coarse PM ($PM_{10-2.5}$) short-term 24-hr average standard of 70 $\mu g/m^3$ (98th percentile form). This level does not provide an adequate margin of safety to protect children. In addition, there is no justification to exclude children who live in areas with populations below 100,000 from protection under the coarse particle standard, or to cease monitoring for coarse particles in these areas.

*Level of the standard*

While the studies cited in the NPRM as the basis for the coarse PM standard looked at morbidity and mortality in adults, the coarse fraction of PM ($PM_{10-2.5}$) has been associated with several respiratory outcomes in children, including significant associations with asthma hospitalizations (Lin et al., 2002), respiratory hospitalizations (Lin et al., 2005; Yang et al. 2004; Burnett et al., 2001), cough (Tiittanen et al., 1999; Schwartz and Neas, 2000; Mar et al., 2004), persistent cough, persistent phlegm and bronchitis (Zhang et al., 2002). Concentrations of daily mean $PM_{10-2.5}$ in these studies range from 6 to 59 $\mu g/m^3$. In some, the upper percentiles of daily $PM_{10-2.5}$ are well below the proposed standard of 70$\mu g/m^3$. A recent review of over 30 studies (many published prior to 2003) that evaluated both fine and coarse PM notes that, in many studies, coarse PM is related to respiratory morbidity, including hospital admissions for children, more strongly or at least as strongly as fine PM (Brunekreef and Forsberg, 2005). The NPRM notes that deposition of coarse particles is higher in the tracheobronchial region of the lung, which is a critical target in asthmatics. The proposed standard of 70 $\mu g/m^3$ does not adequately take into account the coarse particle studies that have observed serious health effects in children.

*Rural versus urban*

The NPRM states EPA could not confirm or refute effects of crustal coarse PM ($PM_{10-2.5}$). The EPA's response to this uncertainty has been to exclude rural areas (areas, including small cities, with populations less than 100,000), presumably under the assumption that rural PM is dominated by crustal sources, from coverage under the standard. Exclusion of cities and regions from coverage based on number of residents is an unprecedented departure from previous practice under the NAAQS program and runs counter to the purpose of a national standard. Limiting the $PM_{10-2.5}$ standard to urban areas is not scientifically supportable and is not in the interests of the health of children living in small cities and rural areas. It should be noted that wind-blown dusts can contain toxic elements. For example, arsenic, cadmium, and nickel are in high concentration in the soil of the Owens Valley in California, an area with high coarse PM levels. Crystalline silica, a common constituent of rural dust, is a human carcinogen and can cause silicosis at relatively low levels in occupational settings. Chronic silicosis has been described after environmental exposures to silica in regions where soil silica content is high and dust storms are common (ATS, 1997). Thus, there is insufficient data to reasonably conclude that there is no need to regulate rural $PM_{10-2.5}$.

*Exemption of agriculture and mining industries*

The EPA has categorically exempted agricultural and mining sources of coarse PM from the proposed standard. Since under the Clean Air Act, implementation is not to be considered in setting standards, this exclusion could only be justified if there is no basis from a public health standpoint to control particulate matter emissions from these sources. There is insufficient and unpersuasive scientific evidence to support this action, nor was it supported by the Clean Air Science Advisory Committee (CASAC) review.

*Monitoring of coarse particles*

The EPA concluded that there is uncertainty with respect to the risk posed by rural coarse PM. To the extent that such uncertainty exists, the EPA proposal to decrease monitoring for coarse particles in rural areas prevents future scientific studies that would be able to resolve this uncertainty. We urge the Administrator to require ongoing monitoring of the coarse PM fraction in rural areas.

**Conclusions and Recommendations**

The CASAC and the EPA staff paper have both made recommendations that support more health protective standards than those proposed in the NPRM. The CHPAC urges you to revise the proposed $PM_{2.5}$ daily and annual standards and the $PM_{10-2.5}$ daily standard downward to the lower end of the ranges recommended in the EPA staff paper and by CASAC, to extend coverage of the coarse PM standard to rural children, and to continue monitoring coarse PM in both rural and urban areas. We thank you in advance for considering these comments, and would be happy to discuss these comments with you or your staff.

Sincerely,

Melanie A. Marty

Melanie A. Marty, Ph.D., Chair
Children's Health Protection Advisory Committee

Cc: William Wehrum, Designated Assistant Administrator, Office of Air and Radiation
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